EXHIBIT A

IEEE 100

THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS

SEVENTH EDITION

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The Authoritative Dictionary of IEEE Standards Terms

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How to Use This Dictionary

The terms defined in the Dictionary are listed in *letter-by-letter* alphabetical order. Spaces are ignored in this style of alphabetization, so *cable value* will come before *cab signal*. Descriptive categories associated with the term in earlier editions of the Dictionary will follow the term in parentheses. New categories appear after the definitions (see Categories, below), followed by the designation of the standard or standards that include the definition. If a standard designation is followed by the letter *s*, it means that edition of the standard was superseded by a newer revision and the term was not included in the revision. If a designation is followed by the letter *w*, it means that edition of the standard was withdrawn and not replaced by a revision. A bracketed number refers to the non-IEEE standard sources given in the back of the book.

Abstracts of the current set of approved IEEE standards are provided in the back of the book. It should be noted that updated information about IEEE standards can be obtained at any time from the IEEE Standards World Wide Web site at http://standards.ieee.org/.

Categories

The category abbreviations that are used in this edition of the Dictionary are defined below. This information is provided to help elucidate the context of the definition. Older terms for which no category could be found have had the category *Std100* assigned to them. Note that terms from sources other than IEEE standards, such as the National Electrical Code® (NEC®) or the National Fire Protection Association, may not be from the most recent editions; the reader is cautioned to check the latest editions of all sources for the most up-to-date terminology.

Categories sorted by abbreviation

AES	aerospace and electronic systems
AHDL	computer—Analog Hardware Descriptive Language
AMR	automatic meter reading and energy management
AP	antennas and propagation
ATL	computer—Abbreviated Test Language for All Systems
BA	computer—bus architecture
BT	broadcast technology
C	computer
CAS	circuits and systems
CE	consumer electronics
CHM	components, hybrids, and manufacturing technology
COM	communications
CS	control systems
DA	computer—design automation
DEI	dielectrics and electrical insulation
DESG	dispersed energy storage and generation
DIS	computer—distributed interactive simulation
ED	electron devices
EDU	education
EEC	electrical equipment and components
ELM	electricity metering
EM	engineering management
EMB	engineering in medicine and biology
EMC	electromagnetic compatibility
GRS	geoscience and remote sensing
GSD	graphic symbols and designations
IA	industry applications
IE	industrial electronics
II	information infrastructure
IM	instrumentation and measurement
IT	information theory

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sources given in the back

ok of the book. It should
any time from the IEEE

efined below. This infor-
which no category could
sources other than IEEE
Protection Association,
est editions of all sources

IVHS	intelligent vehicle highway systems
LEO	lasers and electro-optics
LM	computer—local and metropolitan area networks
MAG	magnetics
MIL	military
MM	computer—microprocessors and microcomputers
MTT	microwave theory and techniques
NEC	National Electrical Code
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NI	nuclear instruments
NIR	non-ionizing radiation
NN	neural networks
NPS	nuclear and plasma sciences
ODM	computer—optical disk and multimedia platforms
OE	oceanic engineering
PA	computer—portable applications
PE	power engineering
PEL	power electronics
PQ	power quality
PSPD	power surge protective devices
PV	photovoltaics
QUL	quantities, units, and letter symbols
R	reliability
RA	robotics and automation
REM	rotating electrical machinery
RL	roadway lighting
S&P	computer—security and privacy
SB	stationary batteries
SE	computer—software engineering
SMC	systems, man, and cybernetics
SP	signal processing
Std100	Standard 100 legacy data
SUB	substations
SWG	power switchgear
T&D	transmission and distribution
TF	time and frequency
TRR	transformers, regulators, and reactors
TT	test technology
UFFC	ultrasonics, ferroelectrics, and frequency control
VT	vehicular technology

Categories sorted by name

aerospace and electronic systems	AES
antennas and propagation	AP
automatic meter reading and energy management	AMR
broadcast technology	BT
circuits and systems	CAS
communication	COM
components, hybrids, and manufacturing technology	CHM
computer	C
computer—Abbreviated Test Language for All Systems	ATL
computer—Analog Hardware Descriptive Language	AHDL
computer—bus architecture	BA
computer—design automation	DA
computer—distributed interactive simulation	DIS
computer—local and metropolitan area networks	LM
computer—microprocessors and microcomputers	MM
computer—optical disk and multimedia platforms	ODM
computer—portable applications	PA
computer—security and privacy	S&P
computer—software engineering	SE
consumer electronics	CE

mplete video signal. For monos the picture, blanking, and syn- r systems it includes additional nd color picture information. (LM/C) 802.7-1989r

rminology) A waveform that is, iptive purposes is treated as, the e more waveforms.

waveform (IM/WM&A) 194-1977w

dget that physically contains (C) 1295-1993w

ery) A definite substance re- l specific elements or radicals tinguished from mixture, intimate admixture of resin , softeners, plasticizers, cata- r: rotor. (PE) [9]

set of cartridges that may be (C/SS) 1244.1-2000

a A horn antenna of circular abrupt changes of flare angle (AP/ANT) 145-1993

fice) (reactor, transformer) ed in an insulating fluid that y plastic at normal operating nt transformer; reactor. (SPD/PE) 32-1972r

or electric apparatus) A ween the inside surface of the e major insulation (or con- (is used) is filled with com- (PE/TR) 21-1976

ible joints) Joints in which n insulating compound that temperatures. (PE/IC) 404-1986s

rer and distribution trans- the windings are enclosed becomes solid, or remains ng temperatures. *Note:* The nsformer is determined in e contain or mold used to ion. (PE/TR) C57.12.80-1978r

mpound circular horn an- antenna. t generator) A regulation ct-current generator. *Note:* or separately excited. *See* machine. (EEC/PE) [119]

n antenna system consist- ntennas whose outputs are elements such that grating (AP/ANT) 145-1993

sisting of more than one (C) 610.5-1990w

compound microstrip A microstrip line in which the substrate consists of two or more layers of different electromagnetic properties. (MTT) 1004-1987w

compound rectangular horn antenna A horn antenna of rectangular cross section in which at least one pair of opposing sides has two or more abrupt changes of flare angle or spacing. (AP/ANT) 145-1993

compound source-rectifier exciter (1) (excitation systems for synchronous machines) An exciter whose energy is derived from the currents and potentials of the ac terminals of the synchronous machine and converted to direct current by rectifiers. The exciter includes the power transformers (current and potential), reactors, and rectifiers which may be either noncontrolled or controlled, including gate circuitry. It is exclusive of input control elements. (PE/EDPG) 421.1-1986r (2) (synchronous machines) An exciter whose energy is derived from the currents and potentials of the alternating current terminals of the synchronous machine and converted to direct current by rectifiers. *Notes:* 1. The exciter includes the power transformers (current and potential), power reactors, and power rectifiers which may be either noncontrolled or controlled, including gate circuitry. 2. It is exclusive of input control elements. (PE/EDPG) 421-1972s

compound target* This term has been used to mean either complex target or distributed target. Because of its ambiguity, it is deprecated. (AES/RS) 686-1990

* Deprecated.

compound-wound A qualifying term applied to a direct-current machine to denote that the excitation is supplied by two types of windings, shunt and series. *Note:* When the electromagnetic effects of the two windings are in the same direction, it is termed cumulative compound wound; when opposed, differential compound wound. *See also:* direct-current commutating machine. (EEC/PE) [119]

compound-wound generator A dc generator that has two separate field windings. One supplies the predominating excitation, and is connected in parallel with the armature circuit. The other supplies only partial excitation and is connected in series with the armature circuit. It is proportioned to require an equalizer connection for satisfactory parallel operation. (IA/MT) 45-1998

compound-wound motor A dc motor that has two separate field windings: one, usually the predominating field, connected in parallel with the armature circuit, and the other connected in series with the armature circuit. Speed and torque characteristics are between those of shunt and series motors. (IA/MT) 45-1998

compressed-air circuit breaker *See:* circuit breaker.

compressed file A file that has been transformed in a manner intended to reduce its size without loss of information. (C/FA) 1387.2-1995

compression (1) (data transmission) A process in which the effective gain applied to a signal is varied as a function of the signal magnitude, the effective gain being greater for small rather than for large signals. (PE) 599-1985w

(2) (television) The reduction in gain at one level of a picture signal with respect to the gain at another level of the same signal. *Note:* The gain referred to in the definition is for a signal amplitude small in comparison with the total peak-to-peak picture signal involved. A quantitative evaluation of this effect can be obtained by a measurement of differential gain. *See also:* white compression; black compression; television. (BT/AV) [34]

(3) (oscillography) An increase in the deflection factor usually as the limits of the quality area are exceeded. *See also:* oscillograph. (IM/HFIM) [40]

(4) (image processing and pattern recognition) *See also:* image compression. (C) 610.4-1990w

compressional wave A wave in an elastic medium that is propagated by fluctuations in elemental volume, accompanied by velocity components along the direction of propagation only. *Note:* A compressional plane wave is a longitudinal wave. (SP) [32]

compression gain 10log of the ratio of the magnitude of the peak power of a compressed pulse to the RMS noise power measured. For an unweighted chirp pulse compression system, the value is 10log (TB), where TB is the time bandwidth product (in decibels). (UFFC) 1037-1992w

compression joint (conductor stringing equipment) A tubular compression fitting designed and fabricated from aluminum, copper, or steel to join conductors or overhead ground wires. It is usually applied through the use of hydraulic or mechanical presses. However, in some cases, automatic, wedge, and explosive type joints are utilized. *Synonyms:* splice; sleeve; conductor splice. (T&D/PE) 524a-1993r, 524-1992r

compression point (nonlinear, active, and nonreciprocal waveguide components) The level of the output signal at which the gain of a device is reduced by a specified amount, usually expressed in decibels, as in the 1 dB compression point. (MTT) 457-1982w

compression ratio (gain or amplification) The ratio of (1) the magnitude of the gain (or amplification) at a reference signal level to (2) its magnitude at a higher stated signal level. *See also:* amplifier. (ED) 161-1971w

compresser (data transmission) A transducer, which for a given amplitude range of input voltages, produces a smaller range of output voltages. One important type of compressor employs the envelope of speech signals to reduce their volume range by amplifying weak signals and attenuating strong signals. (PE) 599-1985w

compressor-stator-blade-control system (gas turbines) A means by which the turbine compressor stator blades are adjusted by vary the operating characteristics of the compressor. *See also:* speed-governing system. (PE/EDPG) [5]

COM printer *See:* computer output microfilm printer.

compromise A violation of the security of a system such that an unauthorized disclosure of sensitive information may have occurred. (LM/C) 802.10-1992

computation *See:* implicit computation.

computational bandwidth The maximum number of operations per second a machine can perform. (C) 610.10-1994w

computational data *See:* fixed-point data.

computational model A model consisting of well-defined procedures that can be executed on a computer; for example, a model of the stock market, in the form of a set of equations and logic rules. (C) 610.3-1989w

compute-bound Pertaining to programs that have an abundance of computations. *Synonym:* process bound. *Contrast:* input-output bound. (C) 610.10-1994w

computed tomography (CT) A medical diagnostic technique in which a computer is used to produce an image of cross-sections of the human body by using measured attenuation of X rays through a cross-section of the body. *Synonym:* computer-assisted tomography. *See also:* computer-aided testing; computerized axial tomography. (C) 610.2-1987

computer (1) (A) (emergency and standby power) A machine for carrying out calculations. (B) (emergency and standby power) By extension, a machine for carrying out specified transformations on information. (IA/C/PSE) 446-1987, 165-1977

(2) (A) (software) A functional unit that can perform substantial computation, including numerous arithmetic operations, or logic operations without intervention by a human operator during a run. (B) (software) A functional programmable unit that consists of one or more associated processing units and peripheral equipment, that is controlled by internally stored programs, and that can perform substantial computation, including numerous arithmetic operations or logic operations, without human intervention. *See also:* program. (C/SE) 729-1983

(3) A device that consists of one or more associated processing units and peripheral units, that is controlled by internally

stored programs, and that can perform substantial computations, including numerous arithmetic operations, or logic operations, without human intervention during a run. *Note:* May be stand alone, or may consist of several interconnected units. (C) 610.10-1994w

computer-aided design (CAD) (computer graphics) The use of computers to aid in design layout and analysis. May include modeling, analysis, simulation, or optimization of designs for production. Often used in combinations such as CAD/CAM. *See also:* computer-aided engineering; computer-aided manufacturing; computer-aided design and drafting; design automation. (C) 610.2-1987, 610.6-1991w

computer-aided design and drafting (CADD) The use of computers to aid in design layout, drafting, and analysis. Often used as a synonym for computer-aided design. (C) 610.6-1991w

computer-aided education (CAE) *See:* computer-assisted instruction.

computer-aided engineering (CAE) (1) (computer graphics) The use of computers to aid in engineering analysis and design. May include solution of mathematical problems, process control, numerical control, and execution of programs performing complex or repetitive calculations. *See also:* computer-aided manufacturing; computer-aided design. (C) 610.2-1987, 610.6-1991w

(2) The application of computers to the engineering process. The term now commonly applies to any computer system or program that manipulates data for the purpose of assisting engineering, design, procurement, maintenance, etc. (PE/EDPG) 1150-1991w

(3) A computer-based set of tools to assist in the design and development of integrated circuits. (C/TT) 1450-1999

computer-aided inspection (CAI) The use of computers to inspect manufactured parts. *Synonym:* mechanical inspection. (C) 610.2-1987

computer-aided instruction (CAI) The use of computers to present instructional material and to accept and evaluate student responses. *See also:* computer-assisted instruction; computer-based instruction. (C) 610.2-1987

computer-aided management (CAM) The application of computers to business management activities. For example, database management, control reporting, and information retrieval. *See also:* decision support system; management information system. (C) 610.2-1987

computer-aided manufacturing (CAM) (computer graphics) The use of computers and numerical control equipment to aid in manufacturing processes. May include robotics, automation of testing, management functions, control, and product assembly. Often used in combinations such as CAD/CAM. *See also:* computer-aided design; computer-aided engineering. (C) 610.2-1987, 610.6-1991w

computer-aided page makeup The use of computers to automate the formation of text and graphics into discrete camera-ready pages. *See also:* computer-aided typesetting; photocomposition. (C) 610.2-1987

computer-aided software engineering (CASE) The use of computers to aid in the software engineering process. May include the application of software tools to software design, requirements, tracing, code production, testing, document generation, and other software engineering activities. (C/SE) 1348-1995, 610.12-1990

computer-aided testing (CAT) The use of computers to test manufactured parts. (C) 610.2-1987

computer-aided typesetting The use of computers at any stage of the document composition process. This may involve text formatting, input from a word processing system, or computer-aided page makeup. *Synonym:* computer typesetting. (C) 610.2-1987

Computer and Business Equipment Manufacturers Association The Secretariat for ASC X3-series standards on information technology. (C) 610.7-1995, 610.10-1994w

computer architecture The organizational structure of a computer system, including the hardware and the software. *Contrast:* computer network architecture. (C) 610.10-1994w

computer-assisted instruction (CAI) The use of computers to present instructional material and to accept and evaluate student responses. *Synonyms:* computer-assisted learning; computer-aided instruction; computer-aided education; computer-augmented learning. *See also:* computer-based instruction. (C) 610.2-1987, 610.6-1991w

computer-assisted learning (CAL) *See:* computer-assisted instruction.

computer-assisted system A system that utilizes separate and standalone computers or processors for arithmetic computational and logic functions. All data manipulation and evaluation (e.g., alarm condition annunciation) functions are performed by the system. (IA/MT) 45-1998

computer-assisted tester (test, measurement, and diagnostic equipment) A test not directly programmed by a computer but that operates in association with a computer by using some arithmetic functions of the computer. (MIL) [2]

computer-assisted tomography (CAT) *See:* computed tomography.

computer-augmented learning (CAL) *See:* computer-assisted instruction.

computer automated measurement and control (CAMAC) (1) A standard modular instrumentation and digital interface system. (NPS) 583-1982e

(2) **(FASTBUS acquisition and control)** An internationally standardized modular instrumentation and digital interface system as defined in IEEE Std 583-1982, *IEEE Standard Modular Instrumentation and Digital Interface System (CAMAC)*, and the corresponding documents EUR 4100-1972, *CAMAC: A Modular Instrumentation System for Data Handling*,and IEC Pub 516-1975, *A Modular Instrumentation System for Data Handling; CAMAC System*.; Compiler Automated Measurement and Control. (NID) 960-1986

computer-based education (CBE) *See:* computer-based instruction.

computer-based instruction The use of computers to support any process involving human learning. *Synonyms:* computer-based education; computer-based learning. (C) 610.2-1987

computer-based learning (CBL) *See:* computer-based instruction.

computer-based simulation A simulation that is executed on a computer. *Synonym:* machine-centered simulation. *Contrast:* human-centered simulation. (C) 610.3-1989w

computer-based system A system that utilizes one or more embedded computers or processors to perform its functions. (IA/MT) 45-1998

computer channel *See:* input-output channel.

computer code A machine code for a specific computer. (C) [30], [85]

computer component (analog computer) Any part, assembly, or subdivision of a computer, such as resistor, amplifier, power supply, or rack. (C) 165-1977w

computer conferencing A form of teleconferencing that allows one or more users to exchange messages on a computer network. *See also:* video conferencing. (C) 610.2-1987

computer control (electric power system) (physical process) A mode of control wherein a computer, using as input the process variables, produces outputs that control the process. *See also:* power system. (PE/PSE) [54]

computer-control state (1) (analog computer) One of several distinct and selectable conditions of the computer-control circuit. *See also:* potentiometer set; hold; reset; operate; balance check; static test. (C) 165-1977w

(2) In an analog computer, one of several distinct and selectable conditions of the control circuit. *See also:* operate; balance check; static test; hold; reset; potentiometer set. (C) 610.10-1994w

ical configuration of a solid-state

00-1988r, 301-1976s, 759-1984r
-ray *See:* germanium gamma-ray

cter.
r: Schottky-barrier detector.
iation *See:* semiconductor radia-

surface barrier detector.
ansmission detector; differential

e well-type coaxial detector.
sy of numbers or elements bet-
aight line. The value of the de-
elements. (CAS) [13]
thin a relation, an attribute on
functionally dependent.
(C) 610.5-1990w
rocess, model, or variable whose
es not depend on chance. *Con-*
(C) 610.3-1989w

in which the results are deter-
ionships among the states and
input will always produce the
model depicting a known stoch-
astic model.
(C) 610.3-1989w
ork routing strategy where the
the decision at each node, re-
ns in the network.
(C) 610.7-1995
ble Test Oriented Language.
structure which alter the imped-
nach that a minimum of current
tencies) flows in the structure.
(T&D/PE) 1260-1996
ource statements that are newly
ified for a software product.
(C/SE) 1045-1992
by) A material or materials that
(ED) 224-1965w, [45]
lops software products; "develop-
pment, modification, reuse, re-
my other activity that results in
s the testing, quality assurance,
nd other activities applied to
plies.
) J-STD-016-1995, 1362-1998
hat performs development ac-
nts analysis, design, testing
s software life cycle process.
(C/SE) 1062-1998
s developed, tested, and main-
(C/PA) 1387.2-1995
aphy) The act of rendering an
See also: electrostatography.
(ED) [46]
t cost to create a software prod-
(C/SE) 1298-1992w
evelopmental configuration.

n configuration management,
hnical documentation that de-
of a computer software com-
ent. *Note:* The developmental
loper's control, and therefore
ct: allocated baseline; product
(C) 610.12-1990

development cycle *See:* software development cycle.

development life cycle *See:* software development cycle.

development methodology (software) A systematic approach to the creation of software that defines development phases and specifies the activities, products, verification procedures, and completion criteria for each phase. *See also:* software.
(C/SE) 729-1983s

development platform A system used to prepare an application for execution. Such a system is possibly distinct from the system on which the application will execute.
(C/PA) 1003.13-1998

development specification *See:* requirements specification.

development system (1) The computer system used to compile and configure a PCTS.1.
(C/PA) 2003.1-1992
(2) The computer system used to compile and configure a PCTS.
(C/PA) 13210-1994

development testing Formal or informal testing conducted during the development of a system or component, usually in the development environment by the developer. *Contrast:* acceptance testing; operational testing. *See also:* qualification testing.
(C) 610.12-1990

deviation (1) (A) (software) A departure from a specified requirement. *Contrast:* waiver; engineering change. *See also:* configuration control. (B) (software) A written authorization, granted prior to the manufacture of an item, to depart from a particular performance or design requirement for a specific number of units or a specific period of time. *Note:* Unlike an engineering change, a deviation does not require revision of the documentation defining the affected item. *Contrast:* waiver; engineering change. *See also:* configuration control. (C) (navigation aid terms) The angle between the magnetic meridian and the axis of a compass card. Indicates the offset of the compass card from magnetic north.
(C/AES/GCS) 610.12-1990, 172-1983
(2) (automatic control) Any departure from a desired or expected value or pattern.
(IA/PE/APP/EDPG/IAC) [69], [3], [60]
(3) (nuclear power quality assurance) A departure from specified requirements.
(PE/NP) [124]
(4) Departure from a specified dimension or design requirement, usually defining upper and lower limits. *See also:* tolerance.
(SCC14/QUL) SI 10-1997, 268-1982s

deviation distortion (data transmission) Distortion in an FM receiver due to inadequate bandwidth and inadequate amplitude modulation rejection, or inadquate discriminator linearity.
(PE) 599-1985w

deviation factor (1) (rotating machinery) (wave) The ratio of the maximum difference between corresponding ordinates of the wave and of the equivalent sine wave when the waves are superposed in such a way as to make this maximum difference as small as possible. *Note:* The equivalent sine wave is defined as having the same frequency and the same root-mean-square value as the wave being tested. *See also:* direct-axis synchronous impedance.
(PE) [9]
(2) (electrical measurements in power circuits) The deviation factor is the ratio of the maximum difference between corresponding ordinates of the wave and of the equivalent sine wave to the maximum ordinate of the equivalent sine wave when the waves are superposed in such a way as to make this maximum difference as small as possible. The equivalent sine wave is defined as having the same frequency and the same rms value as the wave being tested.
(PE/PSIM) 120-1989r

deviation, frequency *See:* frequency deviation.

deviation from a sine wave (harmonic control and reactive compensation of static power converters) (converter characteristics) (self-commutated converters) A single number measure of the distortion of a sinusoid due to harmonic components. It is equal to the ratio of the absolute value of the maximum difference between the distorted wave and the fundamental to the crest value of the fundamental. *See also:* maximum theoretical deviation from a sine wave.
(IA/SPC) 936-1987w, 519-1992

deviation integral, absolute *See:* absolute deviation integral.

deviation ratio (frequency-modulation systems) (data transmission) The ratio of the maximum frequency deviation to the maximum modulating frequency of the system.
(PE) 599-1985w

deviation sensitivity (1) (navigation aid terms) The rate of change of course indication with respect to the change of displacement from the course line.
(AES/GCS) 172-1983w
(2) (frequency-modulation receivers) The least frequency deviation that produces a specified output power.
188-1952w

deviation, steady-state *See:* steady-state deviation.

deviation system (control) The instantaneous value of the ultimately controlled variable minus the command. *Note:* The use of system error to mean a system deviation with its sign changed is deprecated. *Synonym:* system overshoot. *See also:* deviation.
(PE/IA/EDPG/IAC) 421-1972s, [60]

deviation, transient *See:* transient deviation.

device (1) (FASTBUS acquisition and control) (FASTBUS device) Any equipment capable of connecting to a segment and responding to the mandatory features of the FASTBUS protocol.
(NID) 960-1993
(2) (696 interface devices) (general system) A circuit or logical group of circuits resident on one or more boards capable of interacting with other such devices through the bus.
(C/MM) 696-1983w
(3) (nuclear power generating station) An item of electric equipment that is used in connection with, or as an auxiliary to, other items of electric equipment. (For example, as used in IEEE Std 649-1980, a device is a starter, contactor, circuit breaker, relay, etc.).
(PE/COM/IA/NP) 649-1980s, 455-1985w, 344-1975s
(4) (programmable instrumentation) A component of a system that does not function as the system-controller but typically receives program messages from and sends response messages to the controller. A device may optionally have the capability to receive control from the controller and become the controller-in-charge of the system. A device meets all the requirements stated in IEEE Std 488.2-1987.
(IM/AIN) 488.2-1992r
(5) (packaging machinery) A unit of an electrical system which is intended to carry but not consume electrical energy.
(IA/PKG) 333-1980w
(6) A medical instrument or other device used to generate data on a particular patient.
(EMB/MIB) 1073.3.1-1994
(7) A hardware unit that is capable of performing some specific function.
(C/BA) 1275-1994
(8) A component of an VXIbus system. Normally, a device will consist of one VXIbus board. However, multiple-slot devices and multiple-device modules are permitted. Some examples of devices are computers, multimeters, multiplexers, oscillators, operator interfaces, and counters.
(C/MM) 1155-1992
(9) In networking, a unit that provides a means for inputting and outputting data over the transmission medium.
(C) 610.7-1995
(10) (software) A mechanism or piece of equipment designed to serve a purpose or perform a function.
(C) 610.10-1994w, 610.12-1990
(11) A computer peripheral or an object that appears to the application as such.
(C/PA) 9945-1-1996, 1003.5-1999
(12) (electrical equipment) An operating element such as a relay, contactor, circuit breaker, switch, valve, or governor used to perform a given function in the operation of electrical equipment.
(SWG/PE/SUB) C37.100-1992, C37.1-1994
(13) Any independent test resource. A test resource may be either manually or automatically controlled. Devices can generate stimuli, measure response, or provide switching control. Examples include voltmeters, counters, and power supplies.
(SCC20) 993-1997

(14) A reference to an integrated circuit or other design structure. (C/TT) 1450-1999

device address The (32-m)-bit identifying number assigned to a FASTBUS device that is compared with the signals on the AD lines during a logical primary address cycle of a FASTBUS operation. The device address is formed by the group and module address fields. The (remaining) low-order m bits are assigned to the internal address field. (NID) 960-1993

device alias A shorthand representation for a device path. (C/BA) 1275-1994

device arguments The component of a node name that is provided to a package's open method to provide additional device-specific information. (C/BA) 1275-1994

device class-broadcast Selective broadcast-class specified by CSR#7. Controls device response to subsequent cycles within the broadcast. (NID) 960-1993

device communications controller (DCC) A communications interface associated with a medical device. A DCC may support one or more physically distinct devices acting as a single network communications unit. Its purpose is to provide a point-to-point serial communication link to a bedside communications controller (BCC). (EMB/MIB) 1073.4.1-2000, 1073.3.3-2000

device control character (data management) A control character used for the control of auxiliary devices associated with a data processing system or data communication system; for example, a control character for switching such devices on or off. (C) 610.5-1990w

device control language A language used to monitor and/or control the state of a device. (C/MM) 1284.4-2000

device coordinate system (computer graphics) A device-dependent coordinate system in which the coordinates of addressable points are expressed in integer addressable units. *Note:* A device driver maps normalized device coordinates or world coordinates to actual device coordinates. (C) 610.6-1991w

device-dependent (computer graphics) Pertaining to that which can be used only on a particular device. *Contrast:* device-independent. (C) 610.6-1991w

device driver (1) (computer graphics) The software that translates device-independent commands into device-specific commands. (C) 610.6-1991w

(2) The software responsible for managing low-level I/O operations for a particular hardware device or set of devices. Contains all the device-specific code necessary to communicate with a device and provides a standard interface to the rest of the system. *See also:* firmware device driver; operating system device driver. (C/BA) 1275-1994

(3) A program that runs on the host and manages the sending and receiving of information from the peripheral. The driver utilizes the link level interface defined in this standard to communicate data between the application program and the peripheral personality. (C/MM) 1284-1994

(4) A software component that permits a system to control and communicate with a peripheral device. *See also:* printer driver; disk driver. (C) 610.10-1994w

Device ID A structured, variable length ASCII message identifying the manufacturer, command set, and model of the peripheral. The message is provided by the peripheral in response to a request issued by the host during the negotiation phase. Provided that the peripheral supports the bidirectional mode requested by the host, this message is provided in the requested mode. The Device ID is intended to assist the host in selecting the device and/or peripheral driver appropriate to the peripheral. (C/MM) 1284-1994

device-independent (computer graphics) Pertaining to that which can be used on a variety of devices. *Contrast:* device-dependent. (C) 610.6-1991w

device interface One of the interfaces specified in this standard that allows devices to be identified, characterized, and used to assist other Open Firmware functions such as booting. (C/BA) 1275-1994

device media control language (data management) A language that may be used to describe the physical layout and organization of data within some physical storage media. (C) 610.5-1990w

device node A particular entry in the device tree, usually describing a single device or bus, consisting of properties, methods, and private data. (A device node may have multiple child nodes and has exactly one parent node. The root node has no parent node.). (C/BA) 1275-1994

device path A textual name identifying a device node by showing its position in the device tree. (C/BA) 1275-1994

device register (A) An addressable register used to store information describing the device. *See also:* control register. (B) An addressable register used to store status and control information, and data for transmission to or from a device. *Synonym:* device status word. (C) 610.10-1994

device rise time (photomultipliers for scintillation counting) The mean time difference between the 10- and 90-percent amplitude points on the output waveform for full cathode illumination and delta-function excitation. DRT is measured with a repetitive delta-function light source and a sampling oscilloscope. The trigger signal for the oscilloscope may be derived from the device output pulse, so that light sources such as the the scintillator light source may be employed. (NPS) 398-1977z

device space (computer graphics) The area defined by the addressable points of a display device. (C) 610.6-1991w

device specifier Either a device path, a device alias, or a hybrid path that begins with a device alias and ends with a device path. (C/BA) 1275-1994

device status word *See:* device register.

device tree A hierarchical data structure representing the physical configuration of the system. (The device tree describes the properties of the system's devices and the devices' relationships to one another. Most Open Firmware elements [devices, buses, libraries of software procedures, etc.] are named and located by the device tree.). (C/BA) 1275-1994

dew point The temperature at which the water vapor in the gas begins to condense, expressed in degrees Fahrenheit (°F) or Celsius (°C). (PE/IC) 1125-1993

device port The physical connection points through which signals flow into or out of a device or where timing, synchronization, and triggering control are accomplished. (SCC20) 993-1987

device type Identifies the set of properties and package classes that a node is expected to implement. Specified by the "device_type" property. (C/BA) 1275-1994

device under test (DUT) The device to be placed in a test fixture and tested. (C/TT) 1450-1999

dew point temperature The temperature at which condensation of water vapor begins in a space. (IA/PSE) 241-1990r

dew withstand voltage test A test to determine the ability of the insulating system to withstand specified overvoltages for a specified time without flashover or puncture while completely covered with dew. (SWG/PE) C37.100-1992, C37.23-1987r

dezincification Parting of zinc from an alloy (parting is the preferred term). *Note:* Other terms in this category, such as denickelification, dealuminification, demolybdenization, etcetera, should be replaced by the term parting. *See also:* parting. (IA) [59]

DF *See:* direction finder.

DF antenna *See:* direction finder antenna system.

DFD *See:* data flow diagram.

D Filter A 300 Hz to 3400 Hz bandpass filter used for measuring noise, impulse noise, or data modem signal power. Noise measured through the D-Notched filter is used to evaluate its effect on the performance of a data modem. (COM/TA) 743-1995

D flip-flop A flip-flop that has one data input, one trigger, and an output which assumes the state of the data input when the trigger is received. (C) 610.10-1994w

hard cover *See:* conductor cover.

hard disk A magnetic disk that consists of a rigid platter. *Synonym:* fixed disk. *Contrast:* floppy disk. *See also:* Winchester disk. (C) 610.10-1994w

hardened computer A computer that is physically designed to function reliably in harsh environments such as extremes of temperature, shock and vibration, humidity or radiation. *Note:* Often required for space and military applications. *See also:* hostile environment computer. (C) 610.10-1994w

hard error (A) An error caused by a hardware failure or by accessing incompatible hardware. (B) A storage error in which the data that is retrieved is wrong and the storage cell will no longer hold the data written to it. *Contrast:* transient error; soft error. (C) 610.10-1994

hard failure (1) A failure that results in complete shutdown of a system. *Contrast:* soft failure. (C) 610.12-1990
(2) A cessation of some system or system component from which there is no possible recovery. (C) 610.10-1994w

hard limiting A type of limiting characterized by very little variation in the output within the range where the output is subject to limiting. *Contrast:* soft limiting. (C) 610.10-1994w

hard line (test, measurement, and diagnostic equipment) Any direct electrical connection between the unit under test and the testing device. (MIL) [2]

hard link (1) The relationship between two directory entries that represent the same file; the result of an execution of the `ln` utility or the POSIX.1 *link*() function. (C/PA) 9945-2-1993
(2) A directory entry. (C/PA) 1387.2-1995

hard macro A cluster whose cell placements relative to each other are fixed. Often the interconnect routing between the cells is also fixed and a parasitics file describing the interconnect is available for the hard macro. The location of the hard macro in the floorplan may or may not be fixed. (C/DA) 1481-1999

hard region A cluster that has defined physical boundaries in a floorplan. All cells contained in the cluster shall be placed within the boundaries of the cluster. (C/DA) 1481-1999

hard-sector Pertaining to a magnetic disk that is segmented by physical, non-alterable means such as a hole, known as an index hole, in the disk. *Contrast:* soft-sector. (C) 610.10-1994w

hardware (1) (software) Physical equipment used to process, store, or transmit computer programs or data. *Contrast:* software. (C) 610.12-1990, 610.10-1994w
(2) Physical equipment used in data processing, as opposed to programs, procedures, rules, and associated documentation. (C/PA) 14252-1996

hardware accelerator (A) A circuit which performs operations normally done in software much faster than they can be done in software. (B) A circuit that performs hardware operations much faster than the original hardware. For example: an 80386 based accelerator for an 80286 based machine. (C) 610.10-1994

hardware check *See:* automatic check.

hardware configuration item (HWCI) An aggregation of hardware that is designated for configuration management and treated as a single entity in the configuration management process. *Contrast:* computer software configuration item. *See also:* configuration item. (C) 610.12-1990

hardware description language (HDL) A general-purpose computer language designed to serve as an interface to the design, documentation, and validation of computer hardware. *Synonym:* computer hardware description language. *See also:* hardware design language. (C) 610.10-1994w

hardware design language (HDL) (1) A specification language with special constructs and, sometime, verification protocols, used to develop, analyze, and document a hardware design. *Contrast:* program design language. *See also:* design language; CINEMA. (C) 610.13-1993w, 610.12-1990
(2) A design language with special constructs and, sometimes, verification protocols, used to develop, analyze, and document, a hardware design or computer architecture. *See also:* hardware description language. (C) 610.10-1994w

hardware failure A change in the characteristics of a system hardware element beyond its design tolerances. (VT/RT) 1483-2000

hardware item An aggregation of hardware that is designated for purposes of specification, testing, interfacing, configuration management, or other purposes. (C/SE) 3-STD-016-1995

hardware language *See:* hardware description language; hardware design language; machine language.

hardware monitor (A) A device that measures or records specified events or characteristics of a computer system; for example, a device that counts the occurrences of various electrical events or measures the time between such events. *See also:* monitor; software monitor. (B) A software tool that records or analyzes hardware events during the execution of a computer program. *See also:* monitor; software monitor. (C) 610.12-1990

hardwire (test, measurement, and diagnostic equipment) Circuitry with the absence of electrical elements, such as resistors, inductors, capacitors; circuits containing only wire and terminal connections with no intervening switching inherent. (MIL) [2]

hardwired (I) (supervisory control, data acquisition, and automatic control) (station control and data acquisition) The implementation of processing steps within a device by way of the placement of conductors between components within the device. The processing steps are not alterable except by modifying the conducting paths between components. (SWG/PE/SUB) C37.1-1987s, C37.100-1992
(2) (hydroelectric power plants) Wired interconnections of relays and other control devices. (PE/EDPG) 1020-1988r
(3) Pertaining to a circuit or device whose characteristics are permanently determined by the interconnections between components. *Contrast:* programmable. (C) 610.10-1994w

hardwired logic A group of logic circuits permanently interconnected to perform a specific function. (C) 610.10-1994w

harmful interference Any emission, radiation, or induction that endangers the functioning, or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service or any other equipment or system operating in accordance with regulations. *See also:* electromagnetic compatibility. (EMC) [53]

harmful quantity of oil A discharge of oil that violates applicable water quality standards, causes a film or sheen upon or discoloration of the surface of the water or adjoining shorelines, or causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines. (SUB/PE) 980-1994

harmonic (harmonic control and reactive compensation of static power converters) (converter characteristics) (self-commutated converters) A sinusoidal component of a periodic wave or quantity having a frequency that is an integral multiple of the fundamental frequency. *Note:* For example, a component, the frequency of which is twice the fundamental frequency, is called a second harmonic. *See also:* noncharacteristic harmonic; characteristic harmonic; relative harmonic content; harmonic components; harmonic content. (IA/SPD/PE/T&D/SPC) 936-1987w, C62.48-1995, 599-1985w, 519-1992, 1250-1995

harmonic analyzer A mechanical device for measuring the amplitude and phase of the various harmonic components of a periodic function from its graph. *See also:* wave analyzer; signal wave; instrument. (EEC/PE) [119]

harmonic, characteristic *See:* characteristic harmonic.

harmonic components (converter characteristics) (self-commutated converters) The components of the harmonic content as expressed in terms of the order and rms (root-mean-

rocedures for testing a rate-inte-
oiled. This standard, when com-
974 (R1994), defines the require-
e terms of characteristics unique
plications in which the dynamic
nly greater than the limitations
974.

. *IEEE Standard Specification*
ocedure for Linear, Single-Axis,
elerometer. A guide for the prep-
meter specification and test pro-
nded to provide common termi-
manufacturers and users. The
lizes a linear, single-axis, non-
nsor with a permanent magnet
anics are considered part of the
ps, performance, environmental,
ns are covered. Information on class-
ce tests, qualification tests, refi-
conditions, test equipment, test
is given.

Guide for Selecting and Testing
bles. This guide covers corrosion
nonly used jackets, electrical
ysical requirements for jackets
rds, and selection and testing of
e responsible for optimizing un-
. The purpose is to present a rea-
the role of jackets so that the
an orderly and organized man-
le to share the highly technical
ly used by electrical engineers,
nists to discuss the more detailed

IEEE Standard Qualification of
ories for Nuclear Power Gener-
ethods for Class 1E lead stor-
sed in nuclear power generating
ontainment are described. Prin-
ation, qualification information,
type tests and analysis proce-
e covered. Battery sizing, main-
installation, charging equipment,
ent are beyond the scope of this

IEEE Standard Definitions of
nd Field Effects of Overhead
ly used terms specific to or as-
ar-line corona and electromag-
ncludes terms related to electric
io frequency propagation, elec-
e, audible noise, coupled volt-
perception, weather and related
ments and measuring devices.

IEEE Guide on Conductor Self-
hods for measuring the inherent
tics of overhead conductors are
ain information in a compatible
ll provide a reliable basis for
mping of conductors in the fi-
s of various investigators. The
mmended are not intended for

IEEE Standard for Qualifica-
Assemblies for Nuclear Power
l requirements, direction, and
1E connection assemblies for
erating stations are provided.
l environmental seals in com-
g wires as assemblies are cov-
multipin, quick, disconnect-type
connection assemblies primarily utilized for instrumentation, control, and power. This standard does not apply to containment electric penetrations, fire stops, in-line splices, or components for service within the reactor vessel.

IEEE Std 576-1989 (R1993). *IEEE Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in the Petroleum and Chemical Industry*. A guide to installation, splicing, termination, and field-proof testing of cable systems is provided. The aim is to avoid premature cable failure due to improper installation and mechanical damage during installation, and to provide a reference that can be specified for cable installations. This standard is not intended to be a design document; many of the problems of installation can be avoided by designing cable layouts with the installation limits of this recommended practice.

IEEE Std 577-1976 (R1992). *IEEE Standard Requirements for Reliability Analysis in the Design and Operation of Safety Systems for Nuclear Power Generating Stations*. Uniform minimum acceptable requirements for the performance of reliability analyses for safety-related systems found in nuclear power generating stations are provided. The requirements can be applied during design, fabrication, testing, maintenance, and repair of systems and components in nuclear power plants. The timing of the analysis depends upon the purpose for which it is performed.

IEEE Std 583-1982 (R1999). *IEEE Standard Modular Instrumentation and Digital Interface System (CAMAC)*. This standard is intended to serve as a basis for a range of modular instrumentation capable of interfacing transducers and other devices to digital controllers for data and control. It consists of mechanical standards and signal standards that are sufficient to ensure physical and operational compatibility between units regardless of source. The standard fully specifies a data bus (Dataway) by means of which instruments and other functional modules can communicate with each other, with peripherals, with computers, and with other external controllers.

IEEE Std 592-1990 (R1996). *IEEE Standard for Exposed Semiconducting Shields on High-Voltage Cable Joints and Separable Insulated Connectors*. Design tests for shield resistance and a simulated fault-current initiation are provided for exposed semiconducting shields used on cable accessories, specifically joints and separable insulated connectors rated 15 kV through 35 kV. The shield is intended to protect the insulation, provide voltage stress relief, maintain the accessory surface at or near ground potential under normal operating conditions, and initiate fault-current arcing if the accessory insulation should fail. A maximum shield-resistance performance is specified to ensure that the accessory shield provides stress relief, and that the shield surface is maintained at or near ground potential. The shield fault-current initiation test demonstrates the ability of the accessory shield to initiate fault-current arcs to ground that will cause overcurrent protective devices to operate should the accessory insulation fail. In this test, special connections and procedures are specified to ensure that full-circuit voltage will be applied to the shield during the test. The test specifications do not, however, attempt to simulate all service conditions or field assembly.

IEEE Std 595-1982 (R1999). *IEEE Standard Serial Highway Interface System (CAMAC)*. A serial highway (SH) system using byte-organized messages and configured as a unidirectional loop, to which are connected a system controller and up to sixty-two CAMAC crate assemblies, is defined. In the primary application, the controlled devices are CAMAC crate assemblies with serial crate controllers that conform to a defined message structure. In other applications, some or all of the controlled devices connected to the SH can be equipment that conforms to a subset of the full specification and is not necessarily constructed in CAMAC format or controlled by CAMAC commands.

IEEE Std 596-1982 (R1999). *IEEE Standard Parallel Highway Interface System (CAMAC)*. The CAMAC parallel highway interface system for interconnecting up to seven CAMAC crates (or other devices) and a system controller is defined. In particular, the signals, timing, and logical organization of the connections from crate controllers and parallel highway drivers to the parallel highway through a standard connector are defined. The internal structures of crate controllers and parallel highway drivers, and the physical construction of the parallel highway system, are defined only as they affect compatibility between parts of the system.

IEEE Std 602-1996. *IEEE Recommended Practice for Electric Systems in Health Care Facilities (IEEE White Book)*. A recommended practice for the design and operation of electric systems in health care facilities is provided. The term "health care facility," as used here, encompasses buildings or parts of buildings that contain hospitals, nursing homes, residential custodial care facilities, clinics, ambulatory health care centers, and medical and dental offices. Buildings or parts of buildings within an industrial or commercial complex, used as medical facilities, logically fall within the scope of this book.

IEEE Std 603-1998. *IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations*. Minimum functional and design criteria for the power, instrumentation, and control portions of nuclear power generating station safety systems are established. The criteria are to be applied to those systems required to protect the public health and safety by functioning to mitigate the consequences of design basis events. The intent is to promote safe practices for design and evaluation of safety system performance and reliability. Although the standard is limited to safety systems, many of the principles may have applicability to equipment provided for safe shutdown, post-accident monitoring display instrumentation, preventative interlock features, or any other systems, structures, or equipment related to safety.

IEEE Std 605-1998. *IEEE Guide for Design of Substation Rigid-Bus Structures*. Rigid-bus structures for outdoor and indoor, air-insulated, and alternating-current substations are covered. Portions of this guide are also applicable to strain-bus structures or direct-current substations, or both. Ampacity, radio influence, vibration, and forces due to gravity, wind, fault current, and thermal expansion are considered. Design criteria for conductor and insulator strength calculations are included.

IEEE Std 610-1990 (R1992). *IEEE Standard Computer Dictionary—A Compilation of IEEE Standard Computer Glossaries*. This dictionary is a compilation of IEEE standard glossaries covering the fields of mathematics of computing, computer applications, modeling and simulation, image processing and pattern recognition, data management, and software engineering. Every effort has been made to include all terms within the designated subject areas. Terms were excluded if they were considered to be parochial to one group or organization; company-proprietary or trademarked; multiword terms whose meaning could be inferred from the definitions of the component words; or terms whose meaning in the computer field could be directly inferred from their standard English meaning.

IEEE Std 610.7-1995. *IEEE Standard Glossary of Computer Networking Terminology*. Terms that pertain to data communications and networking, from the following areas, are defined: Data transmission, general communications, general networks, local area networks, network communications security, network errors, networking hardware, network management, network nodes, network signaling, open system architecture, packet, protocols, standards, and standards organizations, telephony. The glossary is primarily a compilation of terms defined in individual IEEE standards, but also includes a number of common terms.

IEEE Std 610.12-1990. *IEEE Standard Glossary of Software Engineering Terminology*. Terms currently in use in the computer field are identified, and standard definitions are estab-

lished for them. Topics covered include: addressing; assembling, compiling, linking, and loading; computer performance evaluation; configuration management; data types; errors, faults, and failures; evaluation techniques; instruction types; language types; libraries; microprogramming; operating systems; quality attributes; software documentation; software and system testing; software architecture; software development processes; software development techniques; and software tools. This glossary is intended to serve as a useful reference both for those in the computer field and for those who come into contact with computers either through their work or in their everyday lives.

IEEE Std 620-1996. *IEEE Guide for the Presentation of Thermal Limit Curves for Squirrel Cage Induction Machines.* Thermal limit curves for induction machines are defined. A procedure is established for the presentation of these curves, and guidance for the interpretation and use of these curves for machine thermal protection is provided.

IEEE Std 622-1987 (R1994). *IEEE Recommended Practice for the Design and Installation of Electric Heat Tracing Systems for Nuclear Power Generating Stations.* Recommended practices for designing, installing, and maintaining electric heat tracing systems are provided. These electric heat tracing systems are applied, both for critical process temperature control and for process temperature control, on mechanical piping systems that carry borated water, caustic soda, and other solutions. Electric heat tracing systems are also applied on water piping systems to prevent them from freezing in cold weather. The recommendations include identification of requirements, heater design considerations, power systems design considerations, temperature control considerations, alarm considerations, finished drawings and documents, installation of materials, start-up testing, temperature tests, and maintenance of electric pipe heating systems.

IEEE Std 622A-1984 (R1999). *IEEE Recommended Practice for the Design and Installation of Electric Pipe Heating Control and Alarm Systems for Power Generating Stations.* Recommended practices for designing and installing electric pipe heating control and alarm systems, as applied to mechanical piping systems that require heat, are provided. The recommendations include selection of control and alarm systems, accuracy considerations, local control usage, centralized control usage, qualification criteria of controls and alarms, and calibration and testing of controls and alarms. The intent is to ensure design consistency and reliable operation of electric pipe heating control and alarm systems, which in turn will ensure that piping system fluids will be available for use not only during station operation but also during normal shutdown.

IEEE Std 622B-1988 (R2000). *IEEE Recommended Practice for Testing and Start-up Procedures for Electric Heat Tracing Systems for Power Generating Stations.* Recommendations that may be used to ensure that an electric heat tracing system is installed correctly, is properly tested and commissioned, and is functioning correctly are provided. The recommendations cover the sequence for testing materials and components of the electric heat tracing system, installation, preoperational testing of the system, verification of system performance, and the necessary records to be filed. Although this standard is written for power generating stations, the techniques presented can be used on electric heat tracing systems in any application.

IEEE Std 625-1996. *IEEE Recommended Practice to Improve Electrical Maintenance and Safety in the Cement Industry.* Assists in the effective application of relays and other devices for the protection of shunt capacitors used in substations. It covers the protective considerations, along with recommended and alternate methods of protection for the most commonly used capacitor bank configurations. Capacitor bank design trade-offs are also discussed. This guide covers protection of filter tanks and very large EHV capacitor banks, but does not include a discussion of pole-mounted capacitor banks on distribution circuits or application of capacitors connected to rotating apparatus.

IEEE Std 627-1980 (R1996). *IEEE Standard for Design Qualification of Safety Systems Equipment Used in Nuclear Power Generating Stations.* Basic principles for design qualification of safety systems equipment used in nuclear power generating stations are provided. Specification criteria, the development of a qualification program, and documentation are addressed. All types of safety systems equipment—mechanical and instrumentation as well as electrical)—are covered. Principles and procedures for preparing specific safety systems equipment standards are established.

IEEE Std 628-1987 (R1992). *IEEE Standard Criteria for the Design, Installation, and Qualification of Raceway Systems for Class 1E Circuits for Nuclear Power Generating Stations.* Criteria for the minimum requirements in the selection, design, installation, and qualification of raceway systems for Class 1E circuits for nuclear power generating stations are provided. Methods for the structural qualification of such raceway systems are prescribed. Since aging and radiation have no known detrimental effect upon metallic raceway systems, and since nonmetallic raceway systems are limited to underground or embedded applications, these two environmental conditions are not considered, nor are the embedments or structural members to which a support is attached.

IEEE Std 635-1989 (R1994). *IEEE Guide for Selection and Design of Aluminum Sheaths for Power Cables.* Requirements are outlined and design guidelines are established for the selection of aluminum sheaths for extra-high, high-, medium-, and low-voltage cables. Basic installation parameters for aluminum-sheathed cables are also established. In addition, references to industry standards and codes incorporating design and installation requirements of aluminum-sheathed cables and a comprehensive bibliography on the subject are provided.

IEEE Std 637-1985 (R1992). *IEEE Guide for the Reclamation of Insulating Oil and Criteria for Its Use.* Detailed procedures are provided for reclaiming used mineral insulating oils (transformer oils) by chemical and mechanical means to make them suitable for reuse as insulating fluids. Reclamation procedures are described, as are the test methods used to evaluate the progress and end point of the reclamation process, and the essential properties required for reuse in each class of equipment. Suitable criteria for the use of reclaimed oils are identified. The use of oil in new apparatus under warranty is not covered.

IEEE Std 638-1992 (R1999). *IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations.* Procedures for demonstrating the adequacy of new Class 1E transformers, located in a mild environment of a nuclear power generating station, to perform their required safety functions under postulated service conditions are presented. Single- and three-phase transformers rated 601 V to 15 000 V for the highest voltage winding, and up to 2500 kVA (self-cooled rating), are covered. Because of the conservative approach used in the development of this standard for new transformers, the end-point criteria cannot be used for in-service transformers.

IEEE Std 643-1980 (R1992). *IEEE Guide for Power-Line Carrier Applications.* Application information is provided to users of carrier equipment as applied on power-transmission lines. Material on power line carrier channel characteristics is presented, along with discussions on intrastation conductor systems and insulated shield wire systems. Procedures for the calculation of channel performance are given. Data for the calculations are drawn from various sections of the guide. Coupling components are discussed, covering line traps, coupling capacitors, line tuners, coaxial cables, hybrids, and filters. Frequency selection practices are discussed. Future trends are examined with respect to electronic equipment, system improvements, and applications.